CASE STUDY - Ordnance Disposal	
TASK TITLE: Ordnance Disposal	
Task Description:	Ordnance disposal involves responding to the discovery of an unidentified device or possible explosive device. A team of individuals responds to identify the device and determine whether or not the device is an active explosive. Completing these procedures often requires members of the team to repeatedly walk large distances (e.g., 300 - 1000 meters) to and from the device. Heavy pieces of equipment are also carried by the employee over these distances. After the team has determined the status of the device, the device is exploded/deactivated, or otherwise removed from the area. The task involves loading/unloading equipment (e.g., x-ray) onto trucks, traveling to the site, donning specially designed protective gear, and completing the tasks described above.
Job Performance Measures Most Often Impacted by Ordnance Disposal:	Response time is a primary measure of performance. Factors that appear to impact that response time include: • time to unpack and don the protective suit; • time to load equipment onto truck; and • time to unpack/prepare equipment for use in the field. The measure of success is safety, avoidance of injury to individuals or damage to the surrounding area.
Typical Employee Comments about Ordnance Disposal:	Employees first comment about the weight and bulk of the protective suit and the increased fatigue that the suit causes while walking great distances. Primary body parts affected, based on employee complaints of discomfort, are the arms, shoulders, and low back. Secondary concerns are for the legs and feet.
Suggested Level II Analysis:	Dynamic Task Analysis, Biomechanical Lifting Analysis, Metabolic Energy Expenditure Analysis

Shoulder/Neck

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
1. Reaching	• The employee is too low for "dressing" the other employee with protective suit (see Figure 1.1)  **Figure 1.1**	123. Raise the person • provide a stable work platform to assist with dressing torso, shoulders and head • employee being dressed can step up or down to different heights	✓ ✓	✓	med low	med med	med med
2. Arm forces: Repeated contractions of the muscles of the arm or holding/carry-ing materials	• The need to carry heavy equipment over great distances increases stress	48. Provide a cart • place all equipment cases on permanent rollers or wheel carts • fabricate a carrier equipped with a wheel to transport individual pieces of equipment to and from the device 131. Reduce weight of work piece • light-weight equipment and /or storage containers		✓ ✓ ✓	med med high	med med med	med med med

Shoulder/Neck (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
3. High speed, sudden shoulder movements	• Rarely occurs	N/A					
4. Head/neck bent or twisted	• Rarely occurs	N/A					

Hands/Wrists/Arms

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
5. Bent wrists/repeated wrist movements or repeated forearm rotation	• Complexity of suit design increases demands and hands and wrists	11. Eliminate unnecessary tasks • simplified suit design		✓	high	med	med
6. Repeated manipulations with fingers	• Rarely occurs	N/A					
7. Hyper extension of finger/thumb or repeated single finger activation	• Rarely occurs	N/A					
8. Hand/grip forces	• Rarely occurs	N/A					
9. High speed hand/wrist/arm movements or vibration, impact or torque to the hand	• Rarely occurs	N/A					
10. Exposure to hard edges	• Rarely occurs	N/A					

Hands/Wrists/Arms (cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
11. Hands and fingers exposed to cold temperatures	• Working in a cold environment exposes the hands to cold.	104. Provide handles with insulating material • add insulating material to equipment handles to prevent heat transfer		✓	med	med	med
		12. Encourage appropriate seasonal clothing	✓		med	med	med
		93. Provide appropriate gloves	✓		low	med	med

Back/Torso

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
12. Repeated forward or sideways bending movements	• Ground level storage of equipment and containers (see Figure 1.2)  **Figure 1.2**	83. Provide an adjustable-height lift table • large collapsible work platform/table on which equipment and containers can be placed as they are unloaded from the truck.		✓	high	med	high
13. Twisting of the lower back	• Rarely occurs	N/A					
14. High speed, sudden movements	• Rarely occurs	N/A					
15. Static, awkward back postures	• Rarely occurs	N/A					

Back/Torso-(cont'd)

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
16. Lifting forces	• The need to manually carry portable equipment increases force.	48. Provide a cart • fabricate a carrier equipped with a wheel to roll individual pieces of equipment to and from the device location		✓	med	med	med
	• Inappropriate storage container design increases handling requirements	11. Eliminate unnecessary tasks • equip storage cases with hinges so that they may be opened without the employee having to lift and support the weight of the cover.		✓	med	med	med
	• Equipment and suit is stored away from the truck	11. Eliminate unnecessary tasks • dedicated storage area • storage on secured trucks to enable team to store suits and all equipment on trucks; eliminate the need for transferring equipment		✓ ✓	med med to high	med med	med med
17. Pushing or pulling	• Rarely occurs	N/A					
18. Whole body vibration	• Rarely occurs	N/A					

Legs/Feet

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
19. Fixed position, standing	• Rarely occurs	N/A					
20. Exposure to hard edges on legs, knees, and feet	• Knees are exposed to hard edges during kneeling	95. Provide appropriate knee protection • reinforce knee area of protective suit to provide cushioned surface for kneeling		✓	med	med	med
21. Awkward leg postures	• Storage of equipment and cases at floor or ground level requires the employee to kneel or squat (see Figure 1.3)  **Figure 1.3**	124. Raise the work piece/work surface • provide large collapsible work platform/table on which equipment and containers can be placed as they are unloaded from the truck.		✓	high	med	high
22. Standing foot pedal	• Rarely occurs	N/A					

Head/Eyes

Job Factor	Potential Causes	Corrective Action	Level of Changes		Cost	Impact On	
			✓ Minor Modification	✓ Major Change		Quality	Productivity
23. Difficult to see/light levels too low/too high	• Light levels are too low	22. Increase light levels • equip truck or team with area flood light		✓	med	med	med
24. Intensive visual tasks, staring at work objects for long periods	• Rarely occurs	N/A					